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A modal logic for the decision-theoretic projection problem

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Abstract:

The authors present a decidable logic in which queries can be posed about (i) the degree of belief in a propositional sentence after an arbitrary finite number of actions and observations and (ii) the utility of a finite sequence of actions after a number of actions and observations. Another contribution of this work is that a POMDP model specification is allowed to be partial or incomplete with no restriction on the lack of information specified for the model. The model may even contain information about non-initial beliefs. Essentially, entailment of arbitrary queries (expressible in the language) can be answered. A sound, complete and terminating decision procedure is provided.